HCI/GUI Design Applied for Adaptable Context-Aware Mobile Game

CLAP Conference

University of the Arts Bremen

11th February 2012

Joatan Preis Dutra

About the Project

The Universities

A 1 year-project (2009/2010) from:

digitalmedia

Hochschule Bremerhaven

University of Applied Sciences

HOCHSCHULE BREMEN

UNIVERSITY OF APPLIED SCIENCES

The Project

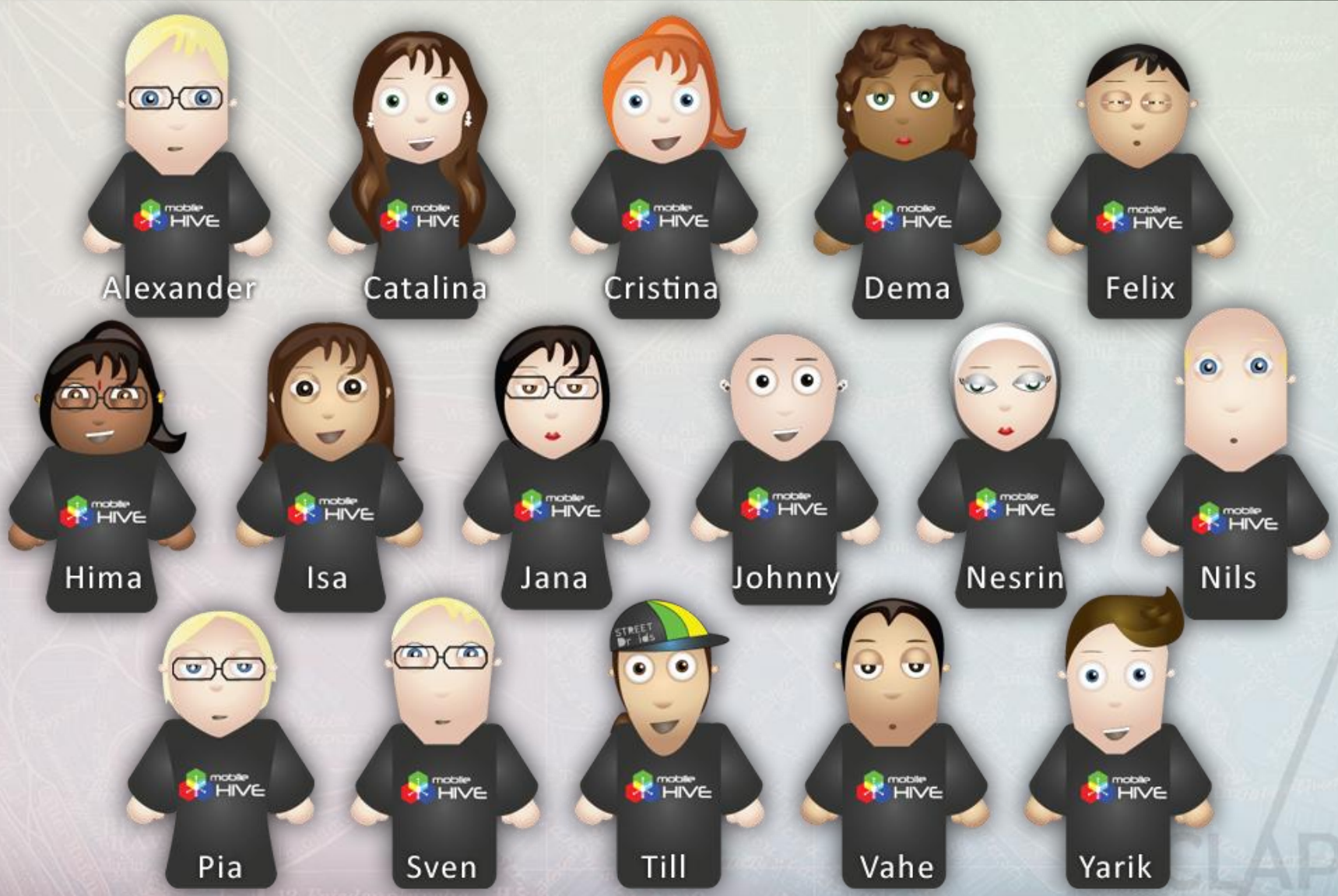
HCI/GUI Design Applied for Adaptable Context-Aware Mobile Game

StreetDroids: A Context-Aware Mobile Game

The Project

HCI/GUI Design Applied for Adaptable Context-Aware Mobile Game

StreetDroids: Collective Project (16 Students/9 Countries)



StreetDroids: About the Project and Paper

This research paper discuss about some aspects related to the design of the user interface applied for mobile games, and the found solutions for designing for small screen, which can be applied for future cases.

The object of study is the *StreetDroids*, a collaborative context-aware mobile game.

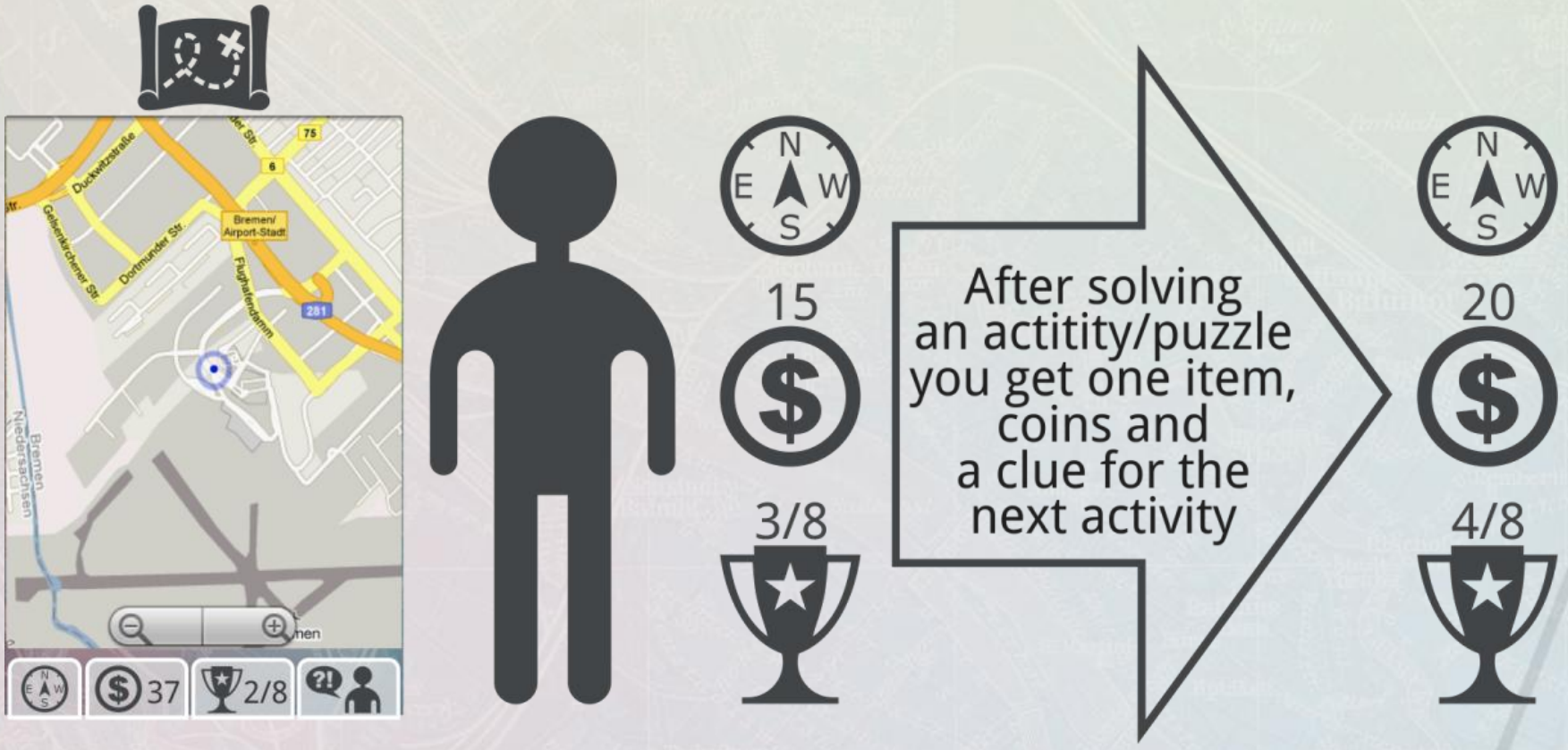
STREET Droids

StreetDroids: Features

- Context-Aware
- Outdoor scenario: GPS based
- Play and explore
- Treasure hunters style
- Based on missions, maps, puzzles and hints
- User could create his/her own content
- Device: T-Mobile G1, with 480x320 pixels screen resolution.

StreetDroids: Game Mechanics

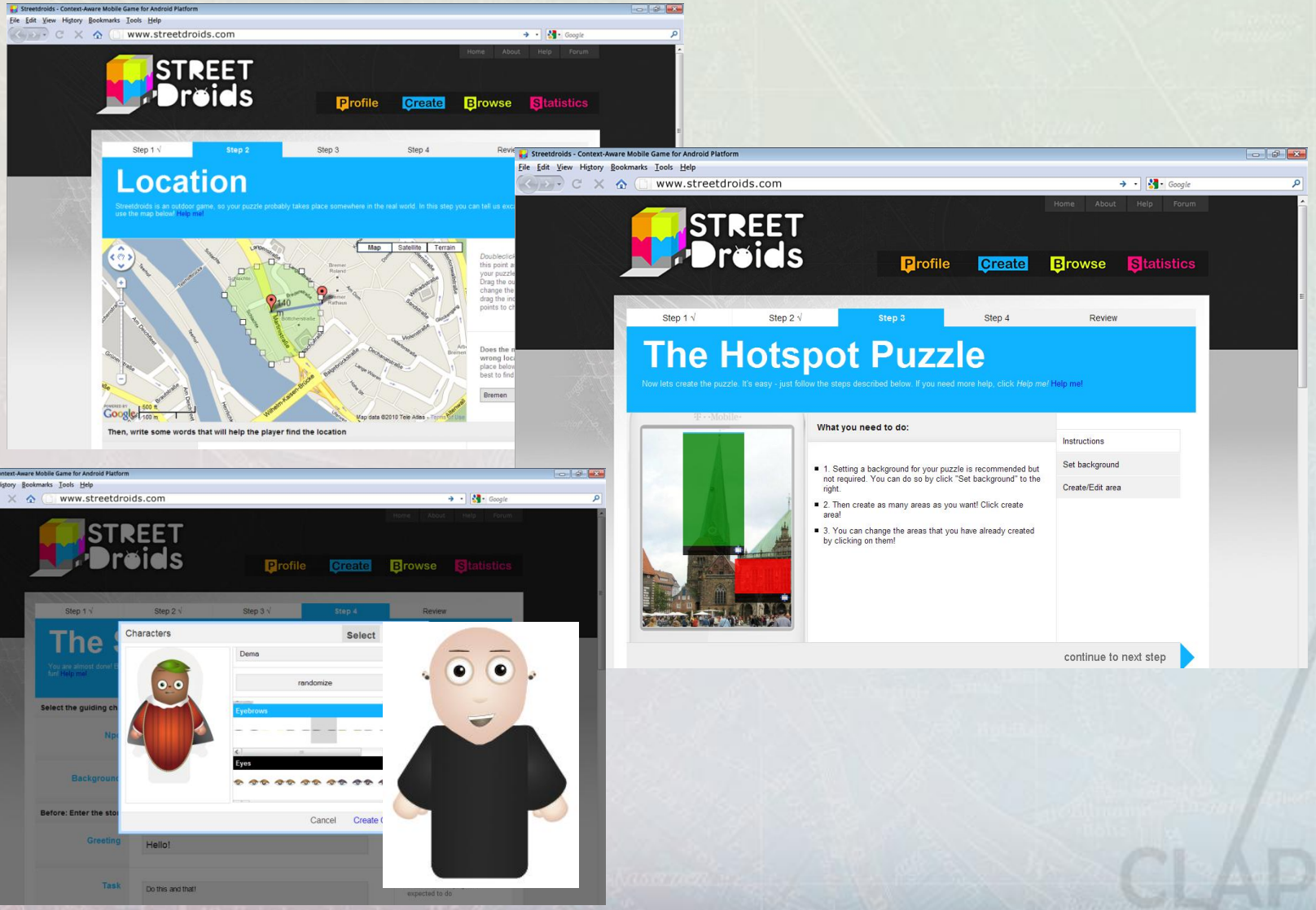
A map with ∞ puzzles/activities



The Project

HCI/GUI Design Applied for Adaptable Context-Aware Mobile Game

StreetDroids: Web-editor



The Project

HCI/GUI Design Applied for Adaptable Context-Aware Mobile Game

StreetDroids: Infinitive Possibilities of Maps

StreetDroids: The first map

The Old city of Bremen was chosen as the first created map and puzzles

The Project

StreetDroids: Puzzle example about Old Bremen

The statue contains a detail that is connected to the granting of market rights; in this puzzle you will explore significant parts of the Roland.

× It's not the sword because it is a symbol for jurisdiction meaning the right to administer justice. In former times this right was owned only by the arch bishop and his representatives.

× The distance between the spikes on the knees of the Roland indicates one "Elle", a scale used for trading.

StreetDroids: Schedule/Production

3rd Benchmarking
16.04.2010

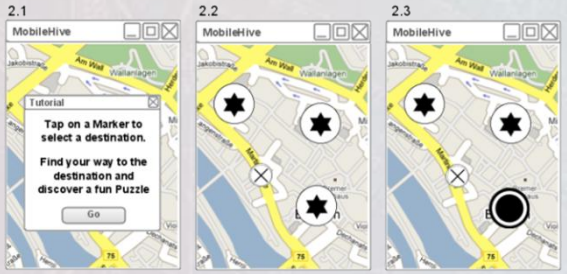
2nd Benchmarking
20.11.2010

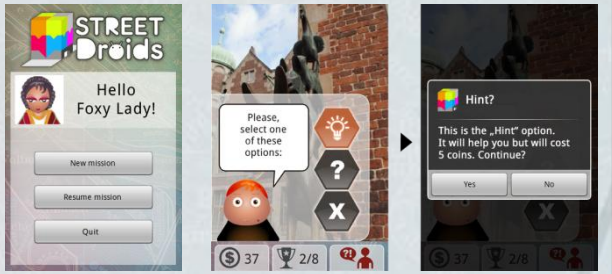
1st Benchmarking
12.06.2010

Evaluation 1

Evaluation 2

Kick-Off
20.03.2009





Paper Prototype

Technical Prototype 1

Technical Prototype 2

Concept

Design Considerations for Small Screens

Design Considerations for Small Screens

Working on small mobile screens is a challenging task. In order to enhance the interaction, studies on HCI and GUI were considered at the development process.

According to Galitz (2007), "*the array of alternatives available to the user is what is presented on the screen or what may be retrieved through what is presented on the screen - nothing less, nothing more*". From this principle, only what the user needs to know about the application and the available options should be presented on the screen, affecting how the design is developed.

Design Considerations for Small Screens

Ronchi (2009) pointed that a well-developed interaction design could serve as bridge to fill the gap between man and machine, enhancing the interaction between them:

"The aim of interaction design is to close this gap (in man/machine communication) by bringing usability into the design process. This means developing interactive products that are easy, effective, and enjoyable to use from the users' perspective."

Design Considerations for Small Screens

StreetDroids was developed for T-Mobile G1, with 480x320 pixels screen resolution (very small).

One possibility about the Smartphones Apps, is using the screen in a vertical or horizontal position. Which makes harder to predict patterns of user behavior because all the content might change according to the device's position.

Taking this design challenge into consideration, the project fixed the vertical position for the game format.

This choice considered also the most common position for handling a mobile phone.

Design Considerations for Small Screens

Another issue around screen usability is the visualization of elements and possibilities of navigation, where a minimum height and width should be considered. The displayed elements cannot be too small, considering that some users may have visual deficiencies.

Also, the projected game has an outdoors context, which means that the lightness of the environment may interfere with the visualization as well. *"For small-screen interfaces, human factors designers face the challenge of displaying all the information they want to present, while making sure that what they present is not too small to be seen by the user."* Kortum (2008)

Design Considerations for Small Screens

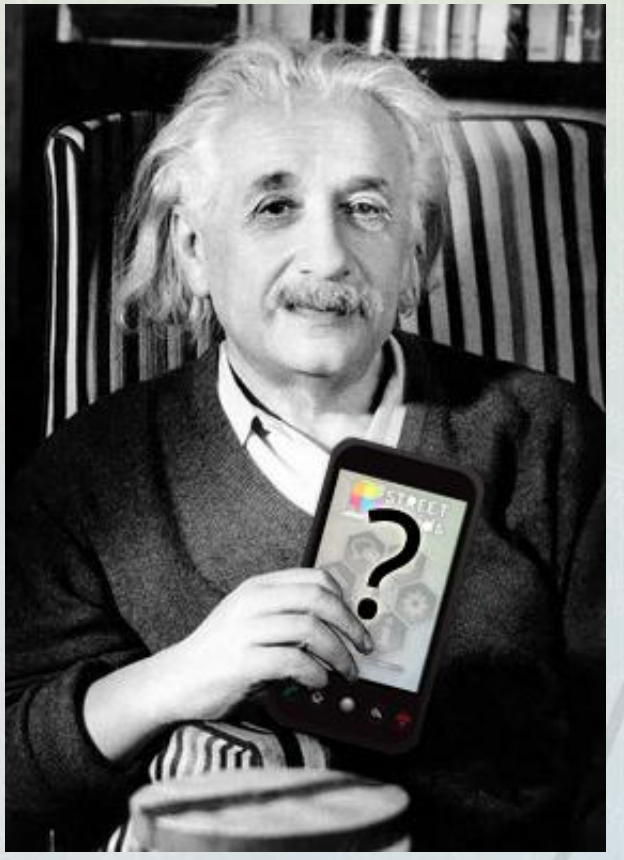
The touch-screen feature is another factor that should be considered for screen design optimization, where the player uses fingers instead of a mouse or joystick. Fingers are less accurate and demand a larger area if compared to a pointer mouse.

"(...)the finger is not a mouse . On the desktop, a user can use a variety of input devices — such as an Apple Mighty Mouse, a Logitech trackball, or a laptop touchpad. But, on screen, the mouse pointer for each of these pieces of hardware is always identical in shape, size, and behavior. (...) Additionally, finger input does not always correspond to a mouse input. A mouse has a left click, right click, scroll, and mouse move. In contrast, a finger has a tap, flick, drag, and pinch." Wagner (2008)

Design Concept for the Game

Design Concept for the Game

Albert Einstein once suggested to "*make everything as simple as possible, but not simpler*"



Evidently he was not referring to design for mobile screens, but this axiom can be perfectly applied for it. An intuitive and attractive user interface is usually a familiar user interface.

Design Concept for the Game

Taking into consideration the aesthetics and functional aspects, the game starts with an iconographic main menu, where the user can access the main features and information about the game, such as Play Game, Language, Quit, Settings, Info/About and Help.

The image - at right - shows a screen-shot of the main menu, where the icons are followed by the message: "*Please select one of the buttons*".

The logo of the game appears on top and disappears on the other screens when it is not needed, opening space for other elements.

Design Concept for the Game

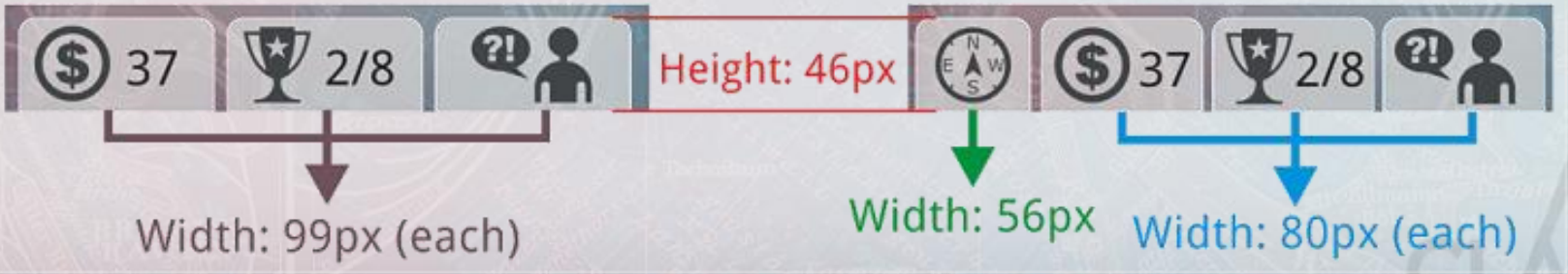
Some research on the appropriate symbols to use for the icons was made, in order to get the proper metaphor for each action, maintaining the visual consistency for each icon group.

The idea was to use the most well-known concept for those actions and metaphors, allowing a meaningful interpretation even in a multicultural environment.

Design Concept for the Game

The research went further and also it was considered the way in which players interact and navigate with the game using their fingers on the touch-screen:

*"User interface designs for touch screens must carefully consider the size of and spacing between touch-activated buttons and icons so that the user's inputs will be accurate. (...) People performed best when it was equal to or bigger than 40*40 pixels."* Sun, et al (2007)



Design Concept for the Game

Game Interface

Optimization of space, simplicity, metaphorical icons and symbols, and direct navigation were the key elements that guided the development of the game interface.

"A metaphor provides an analogy to concepts already familiar to the user, from which the user can deduce the system's use and behavior" ISO/IEC 11581-1:2000 (2000)

Design Concept for the Game

Game Interface

The metaphorical elements were not exclusive for the navigation buttons, but also applied to the entire interface, including background, Non-Player-Character (NPC) and action feedback during the game.

One example is how the NPC “talks” to the player using the metaphor of comics' bubbles (balloons).

Design Concept for the Game

Navigation Design and Immediate Feedback

The use of icons and visual feedback can support the player to become aware of actions and follow consequences.

"*You can improve the flow of your application by helping your user more quickly ascertain the meaning of your controls*" . Mark (2009).

One way to enhance the controlling aspect is using immediate feedback on the navigation. This feedback can be done by image, text and symbols

Conclusions

Conclusions

Planning a good interface design for mobile screen is not just a matter of providing colorful buttons and fancy graphics.

For a game development, *"a well-designed product based on a team effort with a simple, user-friendly interface developed within a reasonable time frame will be successful*". Pedersen (2008).

It was not a "trial and error" process, as commonly can be observed in game development. Each aspect was deeply analyzed based on the theoretical frameworks and translated for each specific case.

Conclusions

Ergonomics, and *internationalization* are important keys for the design development in this project.

The use of icons and symbols is one of the research areas whose results were reflected in the solutions for the user interface.

A general evaluation of the product showed that the design aspects of *StreetDroids* received a positive approval by the consulted users.

It is possible to believe that this is a reflection of two main aspects of the used approach, the choices made in consonant with theoretical foundations and the observation of a meaningful, coherent and well implemented aesthetic language.

Conclusions

An important issue regarding future work on the design interface is the adaptation for different screen resolutions. The Android platform is available for devices with several different screen resolutions, with different aspect ratios. It is not enough to simply scale the game to different resolutions, it is needed to adapt for different space proportions.

Another issue for future implementations is the translation of the game. To this end, it is necessary to use only simple instances of English text, whenever possible. *"Simple English text will be easier and less expensive to translate"* Galitz (2007).

As a recommendation, German should be the first European choice (after English).

References

References

- BBC NEWS | Technology | New PC to encourage older users. (n.d.). Retrieved February 17, 2011, from http://news.bbc.co.uk/2/hi/8352606.stm
- Frederick, G. (2009). Beginning smartphone web development : building JavaScript, CSS, HTML and Ajax-based applications for iPhone, Android, Palm Pre, Blackberry, Windows Mobile and Nokia S60. New York: Apress ;Distributed to the book trade worldwide by Springer-Verlag New York.
- Galitz, W. O. (2007). The essential guide to user interface design: an introduction to GUI design principles and techniques. Wiley Pub.
- Ghaoui, C. (2006). Encyclopedia of human computer interaction. Idea Group Reference.
- ISO/IEC 11581-1:2000(E). (n.d.). Information technology - User system interfaces and symbols - Icon symbols and functions - Part 1: Icons - General. ISO. Retrieved from http://webstore.iec.ch/preview/info_isoiec11581-1%7Bed1.0%7Den.pdf
- Kortum, P. (2008). HCI beyond the GUI: design for haptic, speech, olfactory and other nontraditional interfaces. Elsevier/Morgan Kaufmann.
- Mark, D., Barnard, D., & Bondo, J. (2009). IPhone User Interface Design Projects. Apress.
- Pedersen, R. (2009). Game design foundations (2nd ed.). Sudbury MA: Wordware Pub.
- Pirhonen, A., Isomäki, H., Roast, C., & Saariluoma, P. (2005). Future interaction design. London: Springer.
- Ronchi, A. M. (2009). eCulture: cultural content in the digital age. Springer.
- Sun, X., Plocher, T., & Qu, W. (2007). An Empirical Study on the Smallest Comfortable Button/Icon Size on Touch Screen. Usability and Internationalization: HCI and culture. Springer.
- Supporting Multiple Screens | Android Developers. (n.d.). Retrieved February 17, 2011, from http://d.android.com/guide/practices/screens_support.html
- The new T-Mobile G1 with Google cell phone. (n.d.). Retrieved September 14, 2009, from http://www.t-mobileg1.com/
- Tidwell, J. (2010). Designing Interfaces. O'Reilly Media.
- Wagner, R. (2008). Professional IPhone and IPod Touch Programming: Building Applications for Mobile Safari. John Wiley & Sons.

Thank You!